Political Competition in Legislative Elections*

Stefan Krasa†       Mattias Polborn‡

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Abstract

We develop a theory of electoral competition predicated upon the notion that voters care both about their local candidates’ positions, and the positions of their parties, and that those party positions are in turn determined by the positions of the parties’ elected representatives in the legislature. We show that candidates may be unable to escape the burden of their party association, and that the primary voters in both parties exploit the median voters’ national preferences to nominate the most extreme electable candidates. We derive empirical implication for the analysis of gerrymandering and of representatives’ responsiveness to district opinion.

Keywords: Differentiated candidates, primaries, polarization.

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†Department of Economics, University of Illinois, 1407 W. Gregory Dr., Urbana, IL, 61801. E-mail: skrasa@uiuc.edu

‡Department of Economics and Department of Political Science, University of Illinois, 1407 W. Gregory Dr., Urbana, IL, 61801. E-mail: polborn@uiuc.edu.
1 Introduction

In the basic model of representative democracy, voters elect legislative representatives whose positions reflect the preferences of their respective districts’ median voters. These representatives convene in an amorphous assembly – one in which there are no parties, or parties at least do not play an important role –, and national policy is set to correspond to the preferences of the median representative in this assembly. Thus, the legislature is composed of representatives who are more moderate than the voters who elect them, and actual policy and legislation reflects the most moderate position in this assembly of moderates. Few observers of Congress believe that reality corresponds closely to these predictions, and the central question is why this is so.

We propose a model of electoral competition that can account for a much higher degree of polarization in the legislature, and which is based on three realistic ingredients: First, voters care about both their local candidates’ positions and the national positions of the parties for which they run. Second, the parties’ national positions are determined through some aggregation procedure from the positions of all of a party’s elected representatives. As each representative influences the party position, this creates important spillover effects that are at the center of our analysis. Third, legislative candidates are nominated by policy-motivated primary voters who take both the general election and the legislation process into account when deciding whom to nominate.

The importance of parties is uncontroversial among scholars of legislatures. However, there is surprisingly little analysis of how the fact that each candidate is connected to a party and thus, implicitly, to the positions of candidates of that party from other districts influences nomination decisions, as well as election outcomes in different legislative districts.

Applying the simplest Downsian model naively to Congressional elections – which much of the empirical literature implicitly does – generates counterfactual predictions: Since all candidates adopt the preferred position of their district’s median voter, all voters should be policy-wise indifferent between the Democratic candidate and his Republican opponent. Thus, Republicans in New England or Democrats in rural Western districts should have a substantial chance to be elected to
Congress if only they match their opponent’s policy platform.\(^1\) Furthermore, gerrymandering districts does not help a party to increase their expected representation in Congress. These predictions are certainly counterfactual, but understanding why that is so is challenging.

In our model, voters care about both their local candidates’ positions and the national positions of their respective parties. These national positions are determined by either the average or the median position of all of the party’s legislators. National positions generate spillovers between different districts: The electoral prospects of candidates in a given district are influenced by the ideological positions of their parties’ winning candidates elsewhere. The association with a party that is not attuned with a district’s ideological leanings can be poisonous for a candidate even if his own policy positions are tailor-made for his district.

Consider, for example, Lincoln Chafee, the Republican U.S. senator from Rhode Island from 1999 to 2006. Chafee had taken a number of moderate and liberal positions that brought him in line with voters in his state.\(^2\) In the 2006 election, “exit polls gave Senator Lincoln Chafee a 62 percent approval rating. But before they exited the polls, most voters rejected him, many feeling it was more important to give the Democrats a chance at controlling the Senate. […] ‘I’m caught between the state party, which I’m very comfortable in, and the national party, which I’m not,’ said Mr. Chafee.”\(^3\) His Democratic challenger Whitehouse “succeeded by attacking the instances in which Chafee supported his party’s conservative congressional leadership (whose personalities and policies were very unpopular, state-wide).”\(^4\)

In a review of 2006 campaign ads, factcheck.org summarized: “President Bush was far and away the most frequent supporting actor in Democratic ads […] The strategy is clear: whether they’re referring to a Republican candidate as a ‘supporter’ of the ‘Bush agenda’ or as a ‘rubber-stamp,’ Democrats believe the President’s low approval ratings are a stone they can use to sink their opponents […] Democratic Sen. Hillary Clinton of New York got the most mentions in

\(^{1}\)See Table 1 in Winer et al. (2014) for evidence that a significant share of U.S. Senate elections are non-competitive. In 29.4 percent of U.S. Senate elections between 1922 and 2004 without an incumbent running, the winner received a vote share that was at least 20 percentage points larger than the loser’s vote share.

\(^{2}\)For example, Chafee was pro-choice, anti-death-penalty, supported gay marriage and voted against the Iraq war (see http://en.wikipedia.org/wiki/Lincoln_Chafee).


Republican ads holding forth the supposed horrors of a Democratic-controlled Senate [...] The runner-up is ‘San Francisco Liberal Nancy Pelosi,’ who is mentioned in at least 6 GOP ads as a reason not to vote for a Democrat who would in turn vote to make her Speaker of the House.\footnote{See http://www.factcheck.org/elections-2006/our_2006_awards.html}

We show that “contamination” – as we call this spillover effect – makes most legislative elections uncompetitive and results in an equilibrium in which party members may be able to nominate their ideal candidate, rather than the district median’s ideal candidate, and nevertheless win by a substantial margin. The other party cannot effectively compete because, even if its candidate is at the district median’s ideal position, that voter still dislikes the associated party national position and therefore prefers to vote for the opponent.

In contrast to the classical one-district spatial model, the ideological composition of districts in our model does not only influence the ideological position of elected candidates, but also the chances of parties to win, thus increasing partisan incentives for gerrymandering. We also show that gerrymandering or, more generally, the intensification of the median ideological preferences in some districts, also affects the political equilibrium in those districts where the median voter preferences remain moderate. Our results imply that testing for the causal effect of gerrymandering on polarization in Congress is more complicated than the existing literature has recognized.

Our paper proceeds as follows. Section 2 reviews the related literature. Section 3 provides some stylized facts about statewide executive and legislative elections. In Section 4, we set up the general model, and the main analysis follows in Section 5. Section 6 discusses empirical implications of our model, and Section 7 concludes.

2 Related literature

Ever since Downs’ (1957) seminal work, candidates’ position choice is a central topic in political economy. While the classical median voter framework identifies reasons for platform convergence, many subsequent electoral competition models develop different reasons for policy divergence, such as policy motivation (e.g., Wittman 1983; Calvert 1985; Bernhardt et al. 2009b); entry
deterrence (e.g., Palfrey 1984; Callander 2005); and incomplete information among voters or candidates, in both one-period (e.g. Martinelli 2001; Callander 2008; Bernhardt et al. 2009a; Gul and Pesendorfer 2009; Kartik et al. 2013) and multiperiod settings (e.g. Castanheira 2003; Bernhardt et al. 2004; Duggan and Forand 2013).


In Austen-Smith (1984), the party that wins the majority of n districts implements an aggregate of its candidates’ positions. Each district candidate chooses his position to maximize his chance of winning. If an equilibrium exists, then both party positions fully converge to the median median, while individual candidates’ positions differ. In contrast, in our model, positions are chosen by policy-motivated primary voters, and voters care about both the local candidates’ positions and the national party positions. In our equilibrium, national party positions diverge, and we can analyze the effects of gerrymandering and of more or less radical primary voters.

Snyder (1994) considers a dynamic setting in which voters care only about national party positions that are chosen by the party’s representatives in the pre-election legislature to maximize their individual reelection chances. In Ansolabehere et al. (2012), a special version of this model, the left and the right party locate at the 25th and 75th percentile of the district median distribution.

In Eyster and Kittsteiner (2007), two party leaders choose national positions to maximize their candidates’ aggregate expected utility. Voters care only about their local representative’s position, but candidates have to pay a cost for deviating from their party’s position. In our model, voters care also about national party positions that are jointly determined by all of the party’s elected representatives.

In the probabilistic voting model (e.g., Lindbeck and Weibull 1987; Dixit and Londregan 1995; Banks and Duggan 2005), voters also receive “ideological” payoffs that are independent of the candidates’ positions. One could interpret these ideological payoffs as capturing the effects of the candidate being affiliated with a party, and therefore, implicitly, the party’s other legislators’ positions. However, the “ideology shock” in these models is exogenous, so that one cannot analyze the main point of interest in our model – how does the fact that a party’s national position matters
for voters and is determined as an aggregate of all its representatives’ positions, affect both the voters’ choice between local candidates and the candidates’ equilibrium positions?

In the influential models of Erikson and Romero (1990) and Adams and Merrill (2003), voters receive, in addition to the payoff from the elected candidate’s position, a “partisan” payoff from his party affiliation, which, however, is exogenous and orthogonal to his policy position. Our model provides a microfoundation for these partisan payoffs, and shows how they depend on the equilibrium polarization between the parties’ candidates in other districts, and how they, in turn, affect the candidates’ equilibrium positions.

Our model belongs to the class of differentiated candidates models (Aragones and Palfrey 2002; Soubeyran 2009; Krasa and Polborn 2010a,b, 2012, 2014; Camara 2012). In these models, candidates have some fixed “characteristics” and choose “positions” to maximize their probability of winning. Voters care about both characteristics and positions. In contrast to existing differentiated candidates models, voters’ preferences over characteristics (i.e., the candidates’ party affiliations) are endogenously derived here from the positions of candidates in other districts.

Our model assumes that national party positions matter for voters, and a significant number of models explains why this is so. Conditional party government theory (Rohde, 2010; Aldrich, 1995) and endogenous party government theory (Volden and Bergman, 2006; Patty, 2008) argue that party leaders can use incentives and resources to ensure cohesiveness of their party. Procedural cartel theory (Cox and McCubbins, 2005) argues that party leadership can at least enforce voting discipline over procedural issues. Eguia (2011a,b) and Diermeier and Vlaicu (2011) provide a theory where legislators endogenously choose procedures and institutions that lead to powerful parties. All these models of the importance of parties in Congress take the distribution of legislator preferences as exogenously given, while our model provides for an electoral model and thus endogenizes the types of elected legislators.

Our results are relevant for the large empirical literature that analyzes how primaries, the ideological composition of districts and especially the partisan gerrymandering of districts affects the ideological positions of representatives in Congress (e.g., Lee et al. 2004; McCarty et al. 2009; Hirano et al. 2010). The empirical literature does not derive predictions about the expected cor-
relations from an explicit model of legislative elections, but rather takes the intuition from the isolated election model and simply transfers it. Our model shows that this transfer is not always appropriate, and that the candidates’ equilibrium positions may correspond to the preferences of the parties’ respective primary electorates rather than those of the district median voters.

3 Partisanship in legislative and executive elections

We now show that the electorate’s preference distribution influences the parties’ performance substantially stronger in legislative elections than in executive ones. Within the standard framework, this difference is puzzling, and one can interpret our model as a resolution of this puzzle.

The simple Downsian model predicts that both candidates locate at the median voter’s ideal point, so that all voters are indifferent between both candidates. A liberal or conservative district should not provide an advantage, in terms of the probability of winning the district, to Democrats or Republicans. In practice, though, a district’s ideological preferences do affect the electoral chances of the two parties – we talk of “deep red” or blue states, implying that the candidate of the ideologically favored party has a much clearer path to victory than his opponent.

However, we now show that voters’ ideological preferences have a much larger effect in legislative elections than in executive ones.\(^6\) We consider Gubernatorial and U.S. Senate elections from 1974 to 2012. While both of these types of contests are high-profile, state-wide races, Gubernatorial elections are for executive positions while Senate elections are for legislative ones. Consistent with the empirical literature, we measure the median state ideology by its Partisan Voting Index (PVI), that is, the difference of the state’s average Republican and Democratic Party’s vote share in the past U.S. Presidential election, relative to the nation’s average share of the same.\(^7\)

The dependent variable is the difference between the Democrat’s and the Republican’s share

\(^6\)While this feature is apparently a sort of folk wisdom among political scientists, to the best of our knowledge, there is no published account of this fact.

\(^7\)For example, if, in a particular state, the Republican wins by 7 percent, while nationally, he wins by 3 percent, then the state has a PVI of \(7 - 3 = 4\). Also note that vote shares are calculated relative to the two-party vote, i.e., votes for minor parties are eliminated before the vote share percentages are calculated.
of the two party vote in a particular election. In addition to the main independent variables of interest (PVI and PVI×Senate election), we use incumbency and election type (i.e., Senate or Governor election) dummies and year fixed effects in order to control for the electoral advantage of incumbents, and for election-cycle national shocks in favor of one party.

Table 1: Senate and Gubernatorial elections

<table>
<thead>
<tr>
<th></th>
<th>All States</th>
<th>Without Confederacy States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1974-2012</td>
<td>1990-2012</td>
</tr>
<tr>
<td></td>
<td>1974-2012</td>
<td>1990-2012</td>
</tr>
<tr>
<td>PVI</td>
<td>0.591***</td>
<td>0.563***</td>
</tr>
<tr>
<td></td>
<td>(0.104)</td>
<td>(0.118)</td>
</tr>
<tr>
<td>PVI × Senate</td>
<td>0.457***</td>
<td>0.491***</td>
</tr>
<tr>
<td></td>
<td>(0.141)</td>
<td>(0.159)</td>
</tr>
<tr>
<td>N</td>
<td>1061</td>
<td>703</td>
</tr>
<tr>
<td>r^2</td>
<td>0.528</td>
<td>0.559</td>
</tr>
<tr>
<td></td>
<td>0.511***</td>
<td>0.542***</td>
</tr>
<tr>
<td></td>
<td>(0.111)</td>
<td>(0.126)</td>
</tr>
<tr>
<td></td>
<td>0.517***</td>
<td>0.470***</td>
</tr>
<tr>
<td></td>
<td>(0.149)</td>
<td>(0.170)</td>
</tr>
<tr>
<td></td>
<td>835</td>
<td>554</td>
</tr>
<tr>
<td></td>
<td>0.547</td>
<td>0.584</td>
</tr>
</tbody>
</table>

*** indicates significance at the 1% level.

Table 1 summarizes the results, with the first column (all years since 1974, all states) as the baseline case. For Gubernatorial elections, the omitted category, the PVI coefficient indicates that a one point increase in the Democratic vote share in Presidential elections increases the Democratic gubernatorial candidate’s vote share only by about 0.591 points. In contrast, in Senate elections, the same ideological shift increases the Democratic Senate candidate’s vote share by 0.591 + 0.457 = 1.048 points. Evidently, the difference between executive and legislative elections is substantial and highly significant. The remaining three columns confirm the qualitative robustness of this difference if we restrict to elections after 1990 and if we exclude the political South.8

A coefficient of about 1 for Senate elections is remarkable — if Senate candidates were hard-wired at their party’s Presidential candidate’s position, irrespective of whether such a position is competitive in their respective state, then this should result in a coefficient of about 1. Whenever the disadvantaged candidate is able and willing to adjust his position to better fit the state’s voter

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8At least until the 1990s, there were many conservative Southern Democrats in state politics in the South, so it is useful to check that our results are not just driven by this region of the country.
preferences, this would reduce the advantage of the opponent, and thus the estimated coefficient. Somehow, only gubernatorial candidates appear, at least to some extent, capable of such a position adjustment, while Senate candidates are not.

Our model’s explanation for this phenomenon, detailed in the following sections, is that Governor candidates are perceived as more independent of their party, while Senate candidates, if elected, would become members of the Democratic and Republican Senate caucuses, and so the party positions are more important for voters in these legislative elections.

4 Model

A polity is divided into n districts. In each district \( i \in I = \{1, \ldots, n\} \), both candidates who run for district \( i \)'s seat in the legislature belong to one of two parties ("Democrats" and "Republicans"), respectively. Let \( x_{i,D} \) and \( x_{i,R} \) denote the positions of the candidates competing in district \( i \).

**Voter utility.** If party \( P \)'s candidate wins in district \( i \), then a voter with ideal position \( \theta \) receives utility

\[
(1 - \gamma)\psi_\theta(\bar{x}_P) + \gamma\psi_\theta(x_{i,P}),
\]

where \( 0 < \gamma < 1 \) and \( \bar{x}_P \) is party \( P \)'s national position. If voters only care about their local candidates’ positions, \( \gamma = 1 \), and if voters care only about national party positions, \( \gamma = 0 \).\(^9\) We assume that \( \psi_\theta(x) \) is jointly continuous in \( \theta \) and \( x \), as well as single-peaked with a bliss point at \( \theta \), i.e., \( \psi_\theta(x) \) is strictly increasing in \( x \) for \( x < \theta \) and strictly decreasing for \( x > \theta \). The position of the median voter in district \( i \) is denoted by \( M_i \).\(^{10}\)

The utility function (1) is somewhat behavioral or “expressive:” When deciding for whom to vote, the voter takes into account both the local candidates’ positions and those of the national

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\(^9\) The spillover in our model is related to the concept of “Presidential coattails” (PC), the well-known concept in American politics that a strong Presidential candidate improves the electoral prospects of his party’s Congressional candidates (Ferejohn and Calvert (1984); Campbell and Summers (1990)). One can think of PC as arising from a vertical quality spillover, rather than the policy position spillover modeled here, by modeling a Congressional candidate’s total valence as the sum of his own quality, and a term that depends on his party’s Presidential candidate’s valence.

\(^{10}\) Uncertainty about the median could be introduced by assuming that \( M_i \) is drawn from a distribution.
parties, even though the influence of his local choice on the national party positions is either zero or very limited in large elections. Thus, even if a hyper-rational voter mostly cared about party national positions because those influence the laws that Congress makes, he would only focus on the decision that he can influence (i.e., choosing the position of his local representative) while ignoring his preferences on national positions.

Clearly, in a world populated by such hyper-rational voters, we would not see national figures such as Nancy Pelosi or George W. Bush appear in the local campaign ads described in the introduction, and nobody would perceive midterm Congressional elections as a referendum on the President’s policies because he is not on the ballot. However, the notion that voters care about these national personalities and issues in Congressional elections appears very robust in reality, and so our utility function (1) is a natural positive description of this voter behavior.\footnote{An alternative way of modeling the effects analyzed in this paper with fully outcome-focused voters is to assume that they receive a payoff from both their local representative’s position, and from the position of the majority party in Congress. Voters then care about the latter if and only if there is a chance that their local representative affects which party will be in the majority in Congress. Similar effects arise in such a setting (as we have shown in a previous working paper version of this paper, available from the authors upon request).}

**The determination of party positions.** A party’s national position is determined by the positions of its winning candidates. We focus on the cases where the party policy is either the median or the average of the positions of the party’s elected representatives. The median has been used in Snyder (1994) and Ansolabehere et al. (2012). It can be interpreted as a formalization of the “Hastert Rule” that stipulates that the Speaker of the House should admit legislative proposals to the floor of the House if and only if they have the support of the majority of representatives in the majority party, and thus provides a powerful position to the median of the majority party. More formally, let $K_P$ be the set of these winning candidates of party $P = D, R$. Then in the first case the party position would be $\bar{x}_P = \text{median}\{x_{i,P} | i \in K\}$. In the second case the party position would be $\bar{x}_P = (1/|K|) \sum_{i \in K} x_{i,P}$.

**Timeline.** The game proceeds as follows:

**Stage 1** In each district, the local members of each party simultaneously select their candidates,
who are then committed to their policies \( x_{i,D}, x_{i,R} \in \mathbb{R} \). We assume that the nomination process is summarized by the preference parameter of a “decisive primary voter,” whom we can think of as the median party member in the district, and whose ideal positions are denoted by \( m_{i,D} \) and \( m_{i,R} \) for Democrats and Republicans, respectively.

**Stage 2** In each district \( i \), the median voter \( M_i \) observes the local candidates’ positions \( x_{i,D} \) and \( x_{i,R} \), and chooses whom to vote for. For the other districts \( j \neq i \), \( M_i \) does not observe the candidates’ positions, but he has expectations that are correct in equilibrium. We assume that \( m_{i,D} < M_j < m_{i,R} \) for all \( i, j \); that is, primary voters are more extreme than the median voter.

**Stage 3** A party’s elected candidates from all districts determine the national party positions (either via the median or the average) and payoffs are realized; no strategic decisions take place at this stage.

**Equilibrium concept.** We consider subgame-perfect equilibria in pure strategies. That is, district median voters vote for the local candidate whom they prefer, given their (correct) expectation of the positions of candidates and voting outcomes in other districts, and the decisive party primary voters in each district nominate a candidate who maximizes their respective expected utility, given the equilibrium behavior of general election median voters.\(^{12}\)

## 5 Equilibrium Analysis

### 5.1 Convergence and divergence

We now turn to the equilibrium analysis. Our first result shows that, if the median voters of all districts have the same policy preferences, then there exists a unique pure strategy equilibrium

\(^{12}\)Since the nomination decision is made by a policy-motivated party median voter, our model is related to the literature on policy-motivated candidates pioneered by Wittman (1983) and Calvert (1985), who assume that candidates are the ones who are policy-motivated and choose the platform that they run on. In our model, the choice of platform is made by the primary election median voter. Implicitly, we assume that either candidates can commit to an ideological position in the primary, or that candidates are citizen-candidates with an ideal position that is common knowledge.
in which all candidates locate at the median voters’ preferred position. Proposition 1 holds for arbitrary preferences of Democratic and Republican primary voters (as long as they are more liberal and more conservative, respectively, than the median voter), so increased polarization of party primary electorates per se does not lead to policy divergence, as long as general election voters remain moderate. A more detailed discussion of the implication of this result can be found in Section 6.3.

**Proposition 1** Suppose that the median voters in all districts are located at 0. Then,

1. There exists a pure strategy equilibrium in which \( x_{D,i} = x_{R,i} = 0 \) for all districts.
2. \( x_{D,i} = x_{R,i} = 0 \) in all equilibria in which the local primary voters use pure strategies.

At first glance the result may seem obvious. Following the centripetal logic of the Downsian model, a candidate who loses would move closer to the median voter. Hence, in equilibrium everyone must locate at 0. However, this argument ignores that switching the winner in a district may affect the party position itself.

To understand this issue, suppose for the moment that both party positions \( \bar{x}_D \) and \( \bar{x}_R \) are identical and to the left of zero, and consider a district that the Republican wins. In the classic Downsian logic, the Democrat should be willing to move to a slightly more moderate position than the Republican. Here, however, doing so could result in a more conservative party policy \( \bar{x}'_D > \bar{x}_D \), and this jump in the policy would be discrete. Thus, it is possible that Democrats would prefer losing in this district in order to avoid “contaminating” their national position. The proof of Proposition 1 shows that, while these incentives exist for some configurations, *along the equilibrium path*, whoever wins the primary is supported by their respective party in the general election.

Proposition 1 provides a useful baseline against which to interpret the results in the following propositions where, with heterogeneous districts, equilibrium policies diverge. As a first step towards divergence, Proposition 2 shows that there is no equilibrium where candidates’ positions are the same in all districts if not all median voters have the same ideal point.
**Proposition 2** Suppose that there exist two districts i, j in which the median voters’ position differ (i.e., $M_i \neq M_j$). Then there does not exist an equilibrium in which policies are the same across districts.

Intuitively, if all candidates were to locate at the same position $\bar{x}$, then both national party positions are $\bar{x}$. Since median voters’ ideal positions are different, at least one district median voter is located strictly to the left or to the right of $\bar{x}$. In this district, both the median and one of the primary voters prefer a candidate located at the median’s ideal point, which implies that the original strategy profile was not an equilibrium.

Proposition 2 indicates that policy positions differ across districts. However, it could be possible that national policies converge. Our next result, Proposition 3, shows that divergence across districts translates into divergence of party positions. The proposition includes a characterization of equilibria for a model with an arbitrary number of districts. In order to do this, we make two parametric assumption. First, utility is quadratic, i.e., $v_\theta(x) = -(x - \theta)^2$. Second, party policies are determined by the median elected legislators of each party.

Suppose that districts are ordered from liberal to conservative, i.e., $M_i < M_{i+1}$ for $i = 1, \ldots, n$, where $n$ is odd. Primary voters are located at $m_{i,D}$ and $m_{i,R}$, respectively, and are more extreme than the median voters in each district $i$, i.e., $m_{i,D} < M_i < m_{i,R}$. In addition, more conservative districts have more conservative primary voters, i.e., $m_{i,D}$ and $m_{i,R}$ are increasing in $i$.

For simplicity of expositions, we only consider the case where the districts that determine the median party positions have an interior solution, i.e., Democratic positions and Republican positions are strictly more moderate than those of the respective primary voters.\(^\text{13}\)

Proposition 3 below shows that there exists $k$ such that Democrats win in districts $i \leq k$ and Republicans in districts $i > k$. If $k$ is an odd number, then the median Democratic legislator is elected in district $d = (k + 1)/2$, so that $\bar{x}_D = x_{d,D}$, and the median Republican policy is given by $\bar{x}_R = (x_{r,R} + x_{r+1,R})/2$, where $r = (n + k)/2$.

\(^{13}\)It is straightforward, but notationally cumbersome, to generalize the characterization to equilibria in which the party positions are determined in a “safe” district, where the winning candidate is located at the primary voter’s ideal point. In particular, we would have to replace (2) to (5) by inequalities, and require that, whenever the median voter $M_i$ strictly prefers the Democrat, the Democrat is located at $m_{i,D}$ (and similar for Republican leaning districts).
If the Democratic policy in district \(d\) is interior, i.e., \(x_{d,D} > m_{d,D}\), then the median voter in \(d\) must be indifferent, and the Republican in \(d\) must be located at \(M_d\), i.e., \(x_{d,R} = M_d\). If \(M_d\) elects the Republican, then the median Republican legislator is located in district \(r\), so \(M_r\)'s utility of voting Republican is \(-(1 - \gamma)(x_{r,R} - M_d)^2 - \gamma(M_d - M_d)^2\). If \(M_d\) elects the Democrat, his utility is \(-(x_{d,D} - M_d)^2\) because \(x_{d,D}\) is both the local and the national Democratic position. Thus,

\[-(x_{d,D} - M_d)^2 = -(1 - \gamma)(x_{r,R} - M_d)^2.\]  

(2)

Indifference in district \(d + 1\), which does not determine the Democratic national position, yields

\[-(1 - \gamma)(x_{d,D} - M_{d+1})^2 - \gamma(x_{d+1,D} - M_{d+1})^2 = -(1 - \gamma)(x_{r,R} - M_{d+1})^2.\]  

(3)

By analogous arguments, we get equilibrium conditions (4) and (5) for districts \(r\) and \(r + 1\):

\[-(1 - \gamma)\left(\frac{x_r + x_{r+1,R}}{2} - M_r\right)^2 - \gamma(x_{r,R} - M_r)^2 = -(1 - \gamma)\left(\frac{x_{d,D} + x_{d+1,D}}{2} - M_r\right)^2,\]  

(4)

\[-(1 - \gamma)\left(\frac{x_r + x_{r+1,R}}{2} - M_{r+1}\right)^2 - \gamma(x_{r+1,R} - M_{r+1})^2 = -(1 - \gamma)\left(\frac{x_{d,D} + x_{d+1,D}}{2} - M_{r+1}\right)^2.\]  

(5)

In district \(k\), the median voter must at least weakly prefer the Democratic party position, while the reverse must be true in district \(k + 1\), i.e.,

\[M_k \leq \frac{x_{d,D} + x_{r,R}}{2} \leq M_{k+1}.\]  

(6)

Equations (2) to (6) determine party positions, as well as candidates’ positions in districts \(r, r + 1, d, \) and \(d + 1\).\(^{14}\)

Proposition 3 shows that party policies diverge in any pure strategy equilibrium, and that there exists a natural type of equilibrium in which Democrats win liberal districts, Republicans win conservative districts, the positions of elected representatives are monotone in district preferences. Finally, it provides necessary and sufficient conditions that characterize such an equilibrium (es-

\(^{14}\)If \(k\) is even, then analogous conditions hold, replacing Democrats by Republicans. For example, condition (2) turns into the condition for district \(r\), i.e., that is, \(-(x_{r,R} - M_r)^2 = -(1 - \gamma)(x_{d,D} - M_r)^2.\)
Proposition 3 Consider a voting game with an odd number of districts $n$. Assume that districts are ordered with respect to both general election median voters and the parties’ primary voters: $M_i < M_{i+1}$, $m_i, D \leq m_{i+1, D}$ and $m_i, R \leq m_{i+1, R}$ for all $i < n$. Then:

1. Party policies diverge in any pure strategy Nash equilibrium, i.e., $\bar{x}_D \neq \bar{x}_R$.

2. In any pure strategy equilibrium where party positions are interior, i.e., $m_i, D < \bar{x}_D$, $\bar{x}_R < m_i, R$ for all districts $i$, and with $\bar{x}_D < \bar{x}_R$ the following holds:

   (a) There exists $k$ such that liberal districts $i \leq k$ elect Democrats and conservative districts $i > k$ elect Republicans. The positions of elected representatives are monotone in $i$.

   (b) Equilibrium party policies are determined by the districts closest to the median, i.e., $d = \lceil k/2 \rceil$, $d + 1$, and $\text{median}(i > k)$, i.e., $r = k + \lfloor (n-k)/2 \rfloor$, and $r + 1$, respectively.

   Party policies are $\bar{x}_D = x_{d, D}$, $\bar{x}_R = (x_{r, R} + x_{r+1, R})/2$ if $k$ is odd; and $\bar{x}_D = (x_{d, D} + x_{d+1, D})/2$, $\bar{x}_R = x_{r+1, R}$, if $k$ is even.

   Candidate positions in these districts, if interior, satisfy conditions (2) to (6), if $k$ is odd, and analogous conditions where Democrats are replaced by Republicans, if $k$ is even.

3. There exists $\varepsilon > 0$ such that if $M_{d+1} - M_d < \varepsilon$ and $M_{r+1} - M_r < \varepsilon$, then (2) to (5) have a solution in which $x_{d, D} < M_d$, $x_{d+1, D} < M_{d+1}$, and $x_{r, R} > M_r$ and $x_{r+1, R} > M_{r+1}$.

   If, in addition, condition (6) is satisfied, then there exists a pure strategy equilibrium in which policies in districts $d$, $d + 1$, $r$, and $r + 1$ are as above, Democrats win in districts $i \leq k$ and Republicans win in $i > k$.

As in Proposition 1 the challenge for the proof is that changing the winner in a district can move the national party position of the winner’s party. For example, proving that $\bar{x}_D = \bar{x}_R$ is not an equilibrium is more challenging than it may first seem. In particular, one may argue that if party policies were the same, there should be no externality from the national parties and as a consequence, following the Downsian argument candidates should be located at the median voters’ ideal
points \( M_i \). Since these ideal points differ it would give us an immediate contradiction. However, this argument again overlooks that changing the winner in district \( i \) will move the party policy.\(^{15}\)

To find equilibria, we can use the following algorithm. Fix a cutoff district \( k \), and find solutions to conditions (2) to (5). If \((x_{d,D} + x_{r,R})/2 < M_k\), then lower \( k \) by 1 and solve (2) to (5) for the now lower levels of \( d \) and \( r \). Otherwise, if \((x_{d,D} + x_{r,R})/2 > M_{k+1}\) we have to raise \( k \) by 1. We proceed with this until we have found a \( k \) such that \((x_{d,D} + x_{r,R})/2 \) lies between \( M_k \) and \( M_{k+1} \).

It is easy to find an analytic solution for the limiting case where \( M_d = M_{d+1} \) and \( M_r = M_{r+1} \). Without loss of generality, normalize the policy space such that \( M_r = M_d = -M_d \). Then (2) to (5) are reduced to

\[-(x_{r,R} - M)^2 = -(1 - \gamma)(M - x_{d,D})^2, \quad x_{d,D} = x_{d+1,D} = -x_{r,R} = -x_{r+1,R}. \quad (7)\]

Thus, party positions are \( \bar{x}_D = x_{d,D} \) and \( \bar{x}_R = x_{r,R} \) and therefore (7) implies

\[\bar{x}_R = -\bar{x}_D = M \left( \frac{1 + \sqrt{1 - \gamma}}{1 - \sqrt{1 - \gamma}} \right). \quad (8)\]

Since type \((\bar{x}_R + \bar{x}_D)/2 = 0\) is indifferent between the national party platforms, all \( M_i > 0 \) prefer the Republican national position, and all \( M_i < 0 \) prefer the Democratic national position. Thus, in a conservative district \( M_i > 0 \), if both the local Democratic and Republican candidates were to locate at \( M_i \), district \( i \)'s median voter would strictly prefer the Republican. This preference provides some leeway for the Republican primary voter to nominate a more extreme candidate. Furthermore, it implies that the Democrat’s equilibrium position in district \( i \) must be \( x_{i,D} = M_i \) because choosing a different position would allow the Republicans in district \( i \) to choose a more extreme candidate and still win, which would be bad for the Democratic primary voter.

\(^{15}\)For example, if we consider a district in which a Republican currently wins, and a Democrat could deviate and win with some policy \( x_{i,D} \) then \( \bar{x}_D \) will also be changed to some new national policy \( \bar{x}_{D}' \). This change itself may deter the deviation in the first place, and issue that is not present in models where party positions are exogenous such as in Adams and Merrill (2003).
Using these considerations in a district with $M_i > 0$, the most extreme Republican candidate who can still win (i.e., who makes the median voter indifferent) is at

$$-(1 - \gamma)(\bar{x}_R - M_i)^2 - \gamma(x_{i,R} - M_i)^2 = -(1 - \gamma)(\bar{x}_D - M_i)^2. \quad (9)$$

Note that this is the point where the assumption that $M_d$ is close to $M_{d+1}$ is helpful because it implies that the Democratic position does not shift much when $M_i$ elects the Democrat instead.

Solving (9) for $x_{i,R}$ and using the fact that $\bar{x}_R = -\bar{x}_D$ yields

$$x_{i,R} = M_i + 2 \sqrt{\frac{1 - \gamma}{\gamma}} \sqrt{M_i \bar{x}_R}. \quad (10)$$

If the right-hand side of (10) is larger than $m_{i,R}$ then the decisive Republican primary voter can simply set $x_{i,R} = m_{i,R}$, thus nominating his ideal candidate. Hence, in general,

$$x_{i,R} = \min \left\{ M_i + 2 \sqrt{\frac{1 - \gamma}{\gamma}} \sqrt{M_i \bar{x}_R}, m_{i,R} \right\}. \quad (11)$$

The term $2 \sqrt{\frac{1 - \gamma}{\gamma}} \sqrt{\bar{x}_R M_i}$ in (11) is the Republicans’ leeway in district $i$, i.e., the maximal distance from the median voter’s ideal point that a successful Republican candidate can locate at. The term increases if the district median voter $M_i$ is more conservative, because the voter finds the Democratic party position less attractive.

The leeway also increases when voters care more about the national party position (i.e., lower $\gamma$), because of two effects: First, for given national positions, an increase in $1 - \gamma$ implies that the difference between the two parties’ national positions weighs more heavily for the district median voter, and he is therefore willing to tolerate a more extreme position from his preferred party’s local candidate. Second, this direct effect implies that in all districts candidates move to more extreme positions, and therefore the national party positions adjust accordingly. Since the median voter is closer to his preferred party’s position, with any concave utility function, the median voter’s utility difference between his favorite party and the other party increases. This again implies that he will
now tolerate an even more extreme position from his favorite party’s candidate.

A possible reason for party positions to become more important for voters over time is the increasing role that leadership PACs and national campaign committees play for candidates’ fundraising, which makes it harder for candidates to buck the party line in important votes in the legislature. As voters expect that candidates maintain less independence from their parties, the candidates’ own equilibrium positions become more extreme.

As already argued above, if \( M_i + 2 \sqrt{\frac{1 - \gamma}{\gamma}} \sqrt{M_i \bar{x}_R} < m_{i,R} \), then the Democrat must be located at \( M_i \), and while he loses in equilibrium, his presence is important because it constrains the type of candidate that the Republican primary voter can nominate.

In more conservative districts, locating at \( M_i \) remains an optimal strategy for the Democrats, but their position does not really matter if the most extreme position that Republicans can adopt and still be elected, \( M_i + 2 \sqrt{\bar{x}_R M_i \sqrt{\frac{1 - \gamma}{\gamma}}} \) is larger than the primary voter’s ideal point \( m_{i,R} \). In these districts, the Democratic candidate’s position is indeterminate because he imposes no constraint on the Republicans’ behavior. In fact, Democrats might not even bother to nominate a candidate in these districts, or they might nominate a very liberal one. The same applies, analogously, in left-leaning districts.

6 Empirical implications

6.1 District preferences, representatives’ positions and election results

The effect of a radicalization of general election voters and of primary voters on equilibrium positions can be seen in (11). Starting from a situation in which the median voter is indifferent between the candidates (i.e., the first term in (11)), if the district median voter becomes more extreme then the representative’s position becomes more extreme. Because the derivative of (11) with respect to \( M_i \) is greater than 1 for all \( \gamma < 1 \), any change in equilibrium positions is larger than the shift in the median voters’ preferences. Furthermore, changes in the primary voters’ extremism \( \bar{m} \) have no effect on the candidates’ equilibrium positions in this case.
In contrast, if the initial polarization level is so high that, in equilibrium, Democrats win left-leaning districts and Republicans win right-leaning districts with a strict supermajority, then the favored party’s primary voter is essentially unconstrained and can pick his favorite candidate. In this case, changes in the primary voter’s position move the winning candidate’s position one-to-one, while changes of the district median voter’s preferred position have no effect.

Figure 1: District median voter and representatives’ positions

Figure 1 displays the relationship between median voter position and the equilibrium positions of elected representatives in conservative districts. In the numerical simulation, we set $\gamma = 0.5$, and the median voter in the median Democratic and Republican districts to $-1$ and $1$, respectively. In each district, voter preferences are normally distributed around the median. Types $\theta \geq \bar{\theta}$ and $\theta \leq -\bar{\theta}$ vote in the primary, where $\bar{\theta}$ is set such that the primary participation rate in all districts is 20%. As explained above, the representative’s position reacts more strongly to changes in the median voter’s position in relatively moderate districts where the decisive primary voter is constrained by the need to appeal to the general election median voter, than in extreme districts where he is unconstrained, and shifts in the distribution matter only to the extent that they shift the primary voter’s position.

To test this prediction, we focus on open seat House elections from 1990 to 2010 (102nd to 112th Congress). This gives us 487 observations, for which we first estimate a simple probit model with electing a Democrat as the dependent variable, and the district PVI as the explanatory variable.
This gives us, for every district-year combination, an estimate of the probability of electing a Democrat. When this estimated probability is larger than 80 percent, we consider the district as “safe” for Democrats, when it is below 20 percent, we consider it as safe for Republicans, and the remaining ones are non-secure. With this definition, there are 123 safe Republican districts, 100 safe Democratic districts, and 264 district-year combinations in which an open seat race is competitive, of which 156 are won by Republicans and 108 by Democrats.\footnote{Qualitatively, our results presented in the following do not depend on this specific delineation of secure versus non-secure districts. Similar results, which we present in the Online-Appendix, obtain if we define the the safe threshold instead as 15/85 percent and as 10/90 percent. The main problem with these thresholds is that there are fewer “safe” districts under these more restrictive definitions, and thus estimates are less precise.}

For each of the four groups of districts, we then regress the elected representatives DW-Nominate score (times 100), a standard ideological position measure (see Poole and Rosenthal (2000)), on the district PVI at the time of the election. The results are shown in Table 2.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democrat</td>
</tr>
<tr>
<td>Secure</td>
<td>0.200</td>
<td>0.692***</td>
</tr>
<tr>
<td></td>
<td>(0.306)</td>
<td>(0.116)</td>
</tr>
<tr>
<td>Non Secure</td>
<td>1.132***</td>
<td>1.415***</td>
</tr>
<tr>
<td></td>
<td>(0.332)</td>
<td>(0.221)</td>
</tr>
<tr>
<td>Difference</td>
<td>-0.931**</td>
<td>-0.722***</td>
</tr>
<tr>
<td></td>
<td>(0.449)</td>
<td>(0.252)</td>
</tr>
<tr>
<td>$r^2$</td>
<td>0.379</td>
<td>0.569</td>
</tr>
<tr>
<td>$N$</td>
<td>279</td>
<td>208</td>
</tr>
</tbody>
</table>

*** indicates significance at the 1% level, ** at the 5% level, * at the 10% level.

Consistent with the model, the marginal effect of a change in the PVI on the representative’s DW-Nominate score is considerably weaker in secure districts than in non-secure districts. Indeed, in secure Republican districts, the marginal effect is not significantly different from zero. On the Democratic side, the effect in secure districts is positive and significant, but considerably smaller than the effect in non-secure districts.

To gauge the size of the effect, note that the interquartile range of the dependent variable among
Republicans is about 18 points, and among Democrats is about 22 points.\footnote{Our dependent variable is 100 times the DW-Nominate score and thus ranges roughly from −100 to +100.} Thus, among non-secure districts, a district that has a 10 percentage points more Republican PVI (i.e., is substantially more conservative) has, on average, a representative who is more conservative by about 60-65% of the interquartile range. In contrast, the effect of a 10 percentage point PVI shift in a secure district only moves the representative’s expected DW-Nominate score by about 10% of the interquartile range among Republicans, and about 30% among Democrats.

Our model also generates additional predictions on election outcomes and vote shares. First, in contrast to the standard spatial model, the strict preference of the district median voters for one of the two national party positions generates essentially “safe” districts, such as rural districts for Republicans or inner cities for Democrats.

In equilibrium, the winning margin in an interval of districts close to the national median is close to zero, and independent of the specific district’s exact ideological preferences. In contrast, in the more extreme districts where parties are unconstrained and can nominate their respective ideal candidates, the favored party will have a higher vote margin.\footnote{This prediction of our model differs from the model of Callander (2005) that also generates secure and marginal districts. In his model, local candidates have to locate at national party platforms, and the two office-motivated parties choose divergent platforms away from the national median in order to counter the entry threat of independent candidates. As a consequence, the difference between the Republican’s and the Democrat’s vote share in Callander’s model is always a monotone function of the district median’s position.} This is exactly the pattern that Winer et al. (2014) find empirically for U.S. Senate elections between 1922 and 2004: For a range of moderate states (i.e., a range of states with a PVI sufficiently close to zero), the estimated marginal effect of a state’s PVI on the vote difference between Democrats and Republicans is close to zero, while that same marginal effect is much larger for states that are outside this range.

### 6.2 Gerrymandering

Proposition 3, and in particular equation (11) provide important insights into the effects of gerrymandering. By gerrymandering, we mean the design of legislative districts in a way that changes the ideal positions of the district median voters. However, in principle, the following applies equally to changes in district preferences brought about by self-sorting of voters into more ideo-
logically homogeneous districts.

Consider a gerrymander that makes the positions of the decisive voters in districts \(d\) and \(d + 1\) more liberal, and that of the decisive voters in districts \(r\) and \(r + 1\) more conservative. Clearly, this change will lead to a more extreme local position in these districts, and thus to a more liberal Democratic and a more conservative Republican party position.

More importantly, due to equation (11), a more extreme national position affects the equilibrium positions in all remaining districts, even those whose decisive voters remain unchanged. Specifically, gerrymandering-induced polarization of national platforms “spills over” and generates more polarization everywhere, except in those districts where the party primary voters can already nominate their ideal candidates, and possibly in the most moderate district \(M_i = 0\) where the median voter remains indifferent between the party positions.

The spill-over effect in our model has important implications for the empirical analysis of gerrymandering. In an influential paper, McCarty et al. (2009) argue that, while Congress has become more polarized in a time during which electoral districts became more heterogeneous due to gerrymandering, this is merely a temporal coincidence.

Their core argument is as follows: There are some districts in which no gerrymandering occurred (e.g., in small states that have only one or two House districts). Local polarization also increases in these districts, which they argue cannot be caused by gerrymandering. They then difference out the extent of polarization in these districts and argue that only the remaining excess polarization in other districts can be considered as caused by gerrymandering.

Our model highlights a logical problem with this argument: In the language of randomized controlled trials, gerrymandering is not a treatment that only affects the treatment group. In fact, taking the derivative of (10) with respect to \(\bar{x}_R\) shows that \(\frac{\partial \bar{x}_R}{\partial x} = \sqrt{\frac{M_i}{\bar{x}_R}} \sqrt{\frac{1 - \gamma}{\gamma}}\). Clearly, if gerrymandering moves the national Republican party position to the right, then all elected Republican candidates will be more conservative even if their districts were not gerrymandered (i.e., even if \(M_i\) is unchanged). Moreover, it is even possible for the partial derivative to be strictly greater than 1, especially if party positions matter a lot (small \(\gamma\)). In this case the treatment effect is larger in the “untreated” than in the “treated” districts.
Our model also provides new insights into the way in which partisan gerrymanders (ones that favor one particular party) work. In the traditional view, the point of partisan redistricting is to pack as many supporters of the opposing party as possible into some districts, while maintaining a comparatively small advantage in a majority of districts. In this approach, voter preferences for the parties are essentially taken as exogenous. Our model points out an additional effect: By making the districts that are targeted to go to the opposing party more extreme, one may be able to affect the other party’s position, and that makes them less electable in the remaining moderate districts.

An article in the “Nation” describes the Republican redistricting strategy in the South as follows:19 “In the 1980s and 90s, when white Democrats ruled the Statehouses, Republicans supported new majority-minority districts for black Democrats in select urban and rural areas in exchange for an increased GOP presence elsewhere, especially in fast-growing metropolitan suburbs. With Democrats grouped in fewer areas, Republicans found it easier to target white Democrats for extinction [. . .] In the Georgia Senate, Republicans targeted State Senator George Hooks, who has been in the body since 1991 and is known as the dean of the Senate. Hooks represented the peanut farming country of rural Southwest Georgia. Republicans dismantled his district, which had a Black Voting Age Population (BVAP) of 43 percent, moved the black voters in his district into two adjoining majority-minority districts, and pitted Hooks against an incumbent black Democrat in a district that is 59 percent black. His political career is likely finished.”

Our model suggests that the Republicans’ main advantage from these maneuvers is that, following the elimination of prominent white representatives, the Democrats in the South are increasingly perceived by the mostly white electorate as a black party. For example, the Democratic caucus of the 2015/2016 Georgia State Senate has 14 African American and only 4 white members, and this ratio probably condemns Democrats to long-term minority status in a state where white voters outnumber black voters by 2-to-1.

6.3 Do primaries cause polarization?

Hirano et al. (2010) analyze the introduction of direct primaries for Congressional elections in seven U.S. states between 1938 and 1976. This reform replaces a nominating body composed of party bosses – who are conceivably office-motivated – with one that might be more policy-motivated and ideologically extreme. However, this reform does not lead to a significant change of the representatives’ extremism in their data. Similarly, the participation level in primaries, another plausible proxy for the primary electorate’s extremism, has no significant effect on representatives’ extremism either.

Proposition 1 predicts that increased extremism of primary voters does not affect candidates’ positions when the initial situation is characterized by a low level of policy divergence. Proposition 3 shows that in order for polarization to increase significantly when primary voters become more extreme, the positions of median voters must differ substantially across districts, i.e., we need “safe” liberal and “safe” conservative districts.

Note that the institutional reform analyzed by Hirano et al. (2010) takes place in an era in which Congressional districts are very non-gerrymandered and the two national parties’ positions on many issues are close to each other — in fact, in 1950, the American Political Science Association, in a committee report entitled “Toward a more responsible two-party system,” bemoaned that parties did not stand for clearly distinctive political points of view. In such a non-polarized environment, more extreme primary voters do not affect the candidates’ equilibrium positions, while this changes when district preferences are very different: There is complementarity between party extremism and district heterogeneity.

6.4 Extremism in the legislature.

The standard intuition for the moderating effects of political competition is based on a naive single district model. Proposition 3 shows that this intuition does not carry over to our model of legislative elections. Rather than an assembly of district median voters from all over the country, representatives from almost all districts are more extreme than their respective median voter. This
is not caused by extremism of primary voters per se (see Proposition 1), but differences between the locations of the median voters in different districts enable the primary voters of the favored party to nominate candidates who are closer to their own ideal points and win nevertheless.

Our model shows that we should not expect that the legislature necessarily adopts policies with broad popular support, as long as they are unpopular with their own party base. For example, an October 7, 2013 Washington Post opinion poll showed that registered voters disapproved of the Republican party shutting down the government by 71 to 26. Thus, it is very likely that the median voters in most districts – including those held by Republican House members – opposed shutting down the government, but among voters who identify as Republicans, there was a 52-45 majority in favor of the shutdown, and it is likely that, among those who actually vote in Republican primaries, there was an even larger majority in favor of the shutdown.

According to media reports, many Republican representatives “would have liked” to end the government shutdown much sooner, but were afraid that taking this position publicly would put them at risk in their district primary. For example, former House Speaker Dennis Hastert said in an October 7, 2013 interview with NPR: “It used to be they’re looking over their shoulders to see who their general [election] opponent is. Now they’re looking over their shoulders to see who their primary opponent is.”

Our model shows that this fear is justified: Primary voters who refuse to renominate a “moderate” and replace him with a more extremist candidate are not irrational – because even a rather extreme candidate can win. This makes the primary threat so credible.20

Alternative explanations for non-median policy outcomes include lobbying and differential preference intensity. Arguably, neither of these alternative explanations is plausible for the government shutdown.

The lobbying explanation (a strong lobby in favor of the minority position is able to “buy” the support of legislators) requires that benefits on the minority side are highly concentrated, while the issue is a relatively minor issue for most voters. The intensity explanation requires that minority voters care more about the issue, but according to the same Washington Post poll cited above, 12 percent of registered voters “strongly approve” of the shutdown, 14 percent “approved somewhat,” while 53 percent “strongly disapprove” and 18 percent “disapprove somewhat.” Thus, intensity about the issue appears higher among those who disapprove.

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7 Conclusion

Much of the existing literature on electoral competition in legislative elections implicitly assumes that voters evaluate their local candidates based on their positions, but not on the party label under which they run. Such models imply that both parties nominate candidates who are very close to the preferences of the respective district median voters. Therefore, even in districts with rather extreme preferences, both parties’ candidates should be competitive, and the position of Democratic and Republican Congressmen elected from similar districts should be very similar. It is safe to say that these predictions are not borne out in reality, and to understand why this is the case is of first-order importance for our understanding of the democratic system in the United States.

In this paper, we have developed a theory of candidate competition based on the notion that a party’s elected representatives jointly determine the party’s position, and that this position is important for voters. These assumptions appear reasonable and yield qualitatively new insights.

In our model, the fact that voters care about national party positions means that candidates of the same party who run in other districts may “contaminate” the local candidate. This leads to less competitive local elections, providing the ideologically favored party with the leeway to nominate more extreme candidates who are nevertheless elected. As a consequence, the equilibrium of our model explains how electoral competition can beget a very polarized legislature.

Our analysis has three important empirical implications. First, it can explain why a district’s ideological preferences have a smaller partisan effect in elections in which a candidate has a more autonomous policy influence, such as elections for executive leadership positions than in legislative elections. Of course, in reality, even executive leader positions are not entirely autonomous, so there will be some contamination in executive elections as well, but we would expect this effect to be smaller than in legislative elections, and this expectation is borne out in our empirical analysis of Senate and Gubernatorial elections.

Second, our model predicts that elected representatives’ equilibrium positions in relatively competitive districts depend very strongly on the district median voter’s ideology, while in more ideologically extreme districts, the primary voter can essentially implement his ideal position, so
that the representative’s position in these districts is less responsive to the district median voter. Again, we find that this prediction is borne out by data relating a district’s PVI to the DW-Nominate score of its representative in Congress.

Third, much of the existing empirical analysis of the effects of gerrymandering on polarization in Congress is implicitly based on applying a naive model in which voters care only about the local candidates’ positions. Such a model may lead to incorrect inferences about the importance of gerrymandering. For example, the ideal position of the district median voter often does not affect the equilibrium position of candidates at the margin in our model, but the total effect of gerrymandering on polarization in Congress may nevertheless be substantial, and actually may be much larger than in the naive model. Thus, one cannot infer that gerrymandering does not matter for polarization in Congress from showing that there is no marginal effect of changes in district medians on ideological positions of legislators, and that the difference in voting records of Republicans and Democrats representing the same or very similar districts has increased. In general, an implication of our model for empirical work is that legislator behavior in different districts is intricately connected rather than independent, and this implies that one needs to be very careful with claims that difference-in-difference approaches can identify causation.
8 Appendix (for online publication only)

8.1 Proofs of Propositions

Proof of Proposition 1. It is immediate that \( x_{D,i} = x_{R,i} = 0 \) is an equilibrium, since party positions are also at \( \bar{x}_D = \bar{x}_R = 0 \). Thus, any district primary voter who deviates to a candidate not located at zero loses in the general election.

We now prove that party positions must be at 0 in any pure strategy equilibrium.

Claim 1: Let \( \bar{x}_D \) and \( \bar{x}_R \) denote the parties’ policies in equilibrium. Then \( \bar{x}_D \leq 0 \leq \bar{x}_R \).

Suppose by way of contradiction that \( \bar{x}_R < 0 \). Then there must exist a district \( i \) in which the Republican wins with a policy \( x_{R,i} \leq \bar{x}_R \). Suppose that the Republican primary voter in this district nominates a candidate with position \( x'_{R,i} \) that satisfies \( x_{R,i} < x'_{R,i} \leq 0 \). If this candidate were elected then the new Republican party position \( \bar{x}'_R \) would satisfy \( \bar{x}_R \leq \bar{x}'_R \leq 0 \). Thus, both the primary voter, located at zero, as well as the Republican primary voter is strictly better off, contradicting that we have an equilibrium. Hence \( \bar{x}_R \geq 0 \). Similarly, it follows that \( \bar{x}_D \leq 0 \). This proves Claim 1.

Next, assume by way of contradiction, that \( \bar{x}_D \leq 0 \leq \bar{x}_R \) with \( \bar{x}_D \neq \bar{x}_R \). There are five distinct possibilities:

Case 1: \( \bar{x}_R = -\bar{x}_D > 0 \). There must exist a district \( i \) where \( x_{D,i} \leq \bar{x}_D \) and the Democrat wins. But then, the Republican primary voter in district \( i \) could deviate to \( x'_{R,i} = \bar{x}_R - \epsilon \). If elected, the new party position \( \bar{x}'_R \) would satisfy \( \bar{x}_R - \epsilon < \bar{x}'_R \leq \bar{x}_R \). The median voter at zero clearly prefers the new candidate position to the Democrats’ position, since it is closer to his ideal point 0 for small \( \epsilon \), i.e., \( \bar{x}'_R \leq |\bar{x}_D| \) and \( x'_{i,R} < \bar{x}_R \leq |x_{i,D}| \). Similarly, the Republican primary voter strictly prefers that his candidate is elected since \( \bar{x}_D < \bar{x}_R - \epsilon \leq \bar{x}'_R \) and \( x_{i,D} \leq \bar{x}_D < \bar{x}_R - \epsilon < x'_{i,R} \) for small \( \epsilon > 0 \).

Case 2: \( \bar{x}_R = 0 \) and \( \bar{x}_D < 0 \). Again, consider a district \( i \) where \( x_{D,i} \leq \bar{x}_D \) and the Democrat wins. The Republican primary voter could deviate to \( x_{R,i} = 0 \), which would win and increase his utility, since the party position remains unchanged.

Case 3: \( \bar{x}_R > 0 \) and \( \bar{x}_D < 0 \), with \( |\bar{x}_D| > |\bar{x}_R| \). Again, consider a district \( i \) where \( x_{D,i} \leq \bar{x}_D \) and the
Democrat wins. The Republican primary voter could deviate to $x_{R,i} = \bar{x}_R$, which would win and increase his utility.

**Cases 4 and 5:** The remaining two cases — $\bar{x}_D = 0$ and $\bar{x}_R > 0$, and $\bar{x}_R > 0$ and $\bar{x}_D < 0$, with $|\bar{x}_D| < \bar{x}_R$ — are analogous to cases 2 and 3.

Since Cases 1 to 5 lead to a contradiction, it follows that $\bar{x}_D = \bar{x}_R = 0$. It remains to show that all candidates are located at 0.

Suppose by way of contradiction that $x_{D,i} \neq x_{R,i}$ in some district $i$. If the median voter in district $i$ strictly preferred the winner, say the Republican candidate, then we must have $x_{R,i} = m_{i,R}$ (otherwise, the Republican primary voter could increase $x_{i,R}$, and the Republican would still win). Consider the effect of a deviation of the Democratic primary voter to $\bar{x}_{D,i} = 0$. Since $\bar{x}_D = 0$ the Democratic party position would remain at 0 if the Democrat were elected. Thus, the median voter prefers the Democratic candidate, and the Democratic primary voter is strictly better off as well, i.e., the deviation is profitable, a contradiction. Hence $x_{R,i} = x_{D,i} = 0$ in all districts.

**Proof of Proposition 2.** Suppose by way of contradiction that there exists an equilibrium in which all policies are located at some point $\bar{x}$. Then party positions must also satisfy $\bar{x}_D = \bar{x}_R = \bar{x}$. Since $M_i \neq M_j$ we have either $M_i \neq \bar{x}$ or $M_j \neq \bar{x}$.

Without loss of generality suppose that $M_i < \bar{x}$. Then policy $x_{i,D} = M_i$ would make both the median voter and the median Democrat strictly better off — the latter follows because by assumption $m_{i,D} < M_i$. Since such a deviation is profitable, the original policies cannot be an equilibrium.

**Proof of Proposition 3.**

*Proof of Statement 1:* We proceed by way of contradiction assuming that $\bar{x}_D = \bar{x}_R$. The objective is to show that under this assumption $x_{i,D} = x_{i,R} = M_i$ in all districts $i$.

**Claim 1:** Suppose that $\bar{x}_D = \bar{x}_R$. Then all median voters $M_i$ are indifferent between the candidates.
We proceed by way of contradiction, i.e., consider a district \( i \) in which the Republican wins, and suppose that \( M_i \) strictly prefers the Republican. Then the Republican candidate’s position \( x_{i,R} \) could be moved marginally to the right and he would still win. In an equilibrium, the Republican must therefore already be located at the primary voter’s ideal point, i.e., \( x_{i,R} = m_{i,R} \). If the Democrat were located at \( x_{i,D} = M_i \) and would be elected, then the resulting Democratic party position \( \bar{x}_D' \) would either be the same as \( \bar{x}_D \) or be strictly closer to \( M_i \). As a consequence, \( M_i \) would be strictly better off with the Democrat. Note that at \( x_{i,D} = m_{i,D} \) median voter \( M_i \) must be better off electing the Republican, else this deviation would be profitable to the Democrats. By continuity there exists \( x_{i,D} < M_i \) such that \( M_i \) is indifferent between the two candidates.

Suppose that \( \bar{x}_D = \bar{x}_R \geq M_i \). Let \( \bar{x}_D' \) be the Democratic party position if district \( i \) elected the Democrat. Since \( x_{i,D} \leq \bar{x}_D \) it follows that \( \bar{x}_D' \leq \bar{x}_D \). Hence \( x_{i,D} < M_i < x_{i,R} = m_{i,R} \) and \( \bar{x}_D' \leq \bar{x}_R \) imply that the Democrats are strictly better off if they win in district \( i \). They can do so by nominating a candidate who is marginally to the right of \( x_{i,D} \), since this candidate would be strictly preferred by \( M_i \) to the Republican, a contradiction.

Now suppose that \( \bar{x}_D = \bar{x}_R < M_i \). If \( x_{i,D} < \bar{x}_D \) then the same argument as above implies a contradiction. Thus, assume that \( x_{i,D} \geq \bar{x}_D \). This, in turn, implies that \( \bar{x}_D' \geq \bar{x}_D \). Again it follows that \( x_{i,D} < M_i < x_{i,R} \). Thus, a voter of type \( \theta = 0.5(\bar{x}_D' + x_{i,D}) \) strictly prefers the Democrat (the voter is at least as close to \( \bar{x}_D' \) as to \( \bar{x}_R \) and strictly closer to \( x_{i,D} \) than to \( x_{i,R} \)). The net benefit of voting for the Democrat

\[-(1 - \gamma)(\theta - \bar{x}_D')^2 - \gamma(\theta - x_{i,D})^2 + (1 - \gamma)(\theta - \bar{x}_D')^2 + \gamma(\theta - x_{i,R})^2\]

is linear in \( \theta \). Since the \( M_i \) is indifferent and \( \theta < M_i \) strictly prefers the Democrat, it follows that the Democratic primary voter at \( m_{i,D} < M_i \) also strictly prefers the Democrat. As a consequence, the primary voter would be willing to nominate a candidate who is marginally to the right of \( x_{i,D} \), and that candidate would win because \( M_i \) would strictly prefer him to the Republican. This proves Claim 1.

Claim 2: Suppose that \( \bar{x}_D = \bar{x}_R \) and that all median voters \( M_i \) are indifferent between the
candidates. If the Republican wins in district $i$ then $x_{i,R} = M_i$.

First, suppose by way of contradiction that $x_{i,R} < M_i$. Then the Republican primary voter as well as $M_i$ would be strictly better off nominating a candidate with $x_{i,R} = M_i$. Hence we can assume that $x_{i,R} \geq M_i$. Suppose that $x_{i,R} > M_i$. Then it follows again that a Democrat located at $x_{i,D} = M_i$ would be strictly preferred by $M_i$. Using arguments analogous to those in Claim 1, one can show that there exists a deviation $x'_{i,D}$ that makes both $M_i$ and the Democratic primary voter at $m_{i,D}$ strictly better off. This rules out the case that $x_{i,R} > M_i$.

Claim 3: Suppose that $\bar{x}_D = \bar{x}_R$ and that all median voters $M_i$ are indifferent between the candidates. If the Republican wins in district $i$ and $x_{i,R} = M_i$ then $x_{i,D} = M_i$.

Suppose that $x_{i,D} \neq M_i$. Let $x_{i,D} > M_i$. If the Democrats selected a candidate with position $x'_{i,D} = x_{i,D} - \varepsilon$ then the new party position $\bar{x}'_D$ would be closer $M_i$ and hence this deviation would make the median voter at $M_i$ strictly better off, and the Democrat would get elected. As a consequence, this deviation must make the Democratic primary voter strictly worse off, which is only possible if the party position becomes more conservative, i.e., $\bar{x}'_D > \bar{x}_D$. Since, as explained above, the net benefit from the Democrat is linear in a voter’s type $\theta$, and since $M_i$ is indifferent it follows that the Republican primary voters would strictly prefer if the Democrat at the original position $x_{i,D}$ were elected. He can achieve this by selecting any policy $x_{i,R}$ that is sufficiently large such that it makes $M_i$ worse off.

This leaves the case were $x_{i,D} < M_i$. In order for $M_i$ to be indifferent given that $x_{i,R} = M_i$, the Democratic party position $\bar{x}'_D$ must be closer to $M_i$ than $\bar{x}_R$. If $\bar{x}_D \geq x_{i,D}$ then $\bar{x}'_D \leq \bar{x}_D$ and hence the Democrats would be strictly better off if the Democrat wins. They can do so by moving marginally to the right, breaking the indifference of $M_i$. If, instead, $\bar{x}_D < x_{i,D}$ then $\bar{x}'_D \geq \bar{x}_D$. Let $\theta = 0.5(\bar{x}'_D + x_{i,D})$. Then type $\theta$ strictly prefers the Democrat. Since $\theta < M_i$ and since the net benefit of voting for a Democrat is linear in $\theta$ it follows that the Democratic primary voter is also strictly better of if the Democrat wins. Again, this can be achieved by moving marginally to the right. Hence $x_{i,D} = M_i$.

Claim 4: Suppose that $\bar{x}_D = \bar{x}_R$. Then $x_{i,D} = x_{i,R} = M_i$ in all districts $i$. 

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It is immediate that results analogous to Claims 2 and 3 hold if the Democrat wins in a district $i$. Hence, Claims 1 to 3 imply Claim 4.

Since $n$ is odd, one party must have an odd number of legislators. Without loss of generality suppose that this is the case for the Democrats. Hence, there exists a district $M_d$ such that the median of the Republican position is also $M_d$, there exists a district $M_r < M_d$ that elects a Republican. Now suppose the median voter in that district elects the Democrat instead. By Claim 4 the Democrat’s position in district $r$ is $x_{r,D} = M_r$. Then the new Democratic party position is moved to $0.5(M_r + M_d) < M_d = \bar{x}_D$. Since Claim 4 implies that $x_{r,R} = x_{r,D} = M_r$, the median voter is strictly better off from this deviation, a contradiction. Hence $\bar{x}_D \neq \bar{x}_R$.

Proof of Statement 2(a): Let $M_i < 0.5(\bar{x}_D + \bar{x}_R)$. We show that district $i$ must elect a Democrat.

Suppose, by way of contradiction, that the Republican in district $i$ wins with policy $x_{i,R}$. If $x_{i,R} \geq M_i$ then the Democratic candidate could win by choosing $x_{i,D} = M_i$. In particular, the resulting party policy $\bar{x}'_D$ will be as close or closer to $M_i$ than $\bar{x}_D$. Since $M_i < 0.5(\bar{x}_D + \bar{x}_R)$ and $\bar{x}_D < \bar{x}_R$ it also follows that $(M_i - \bar{x}_R)^2 > (M_i - \bar{x}'_D)^2$. Thus, median voter $M_i$ is strictly better off electing the Democrat. Furthermore, since $\bar{x}'_D < \bar{x}_R$, which follows again since $M_i < \bar{x}_R$ and $\bar{x}_D < \bar{x}_R$, and since $x_{i,D} \leq x_{i,R}$, the median Democratic primary voter is also better off.

Now suppose that $x_{i,R} < M_i$. Let $\bar{x}'_D$ be the party policy that would result if the Democratic candidate were elected in district $i$. In order for the Republican to win, it must be true that

\[-(1 - \gamma)(M_i - \bar{x}'_D)^2 - \gamma(M_i - x_{i,D})^2 \leq -(1 - \gamma)(M_i - \bar{x}_R)^2 - \gamma(M_i - x_{i,R})^2. \tag{12}\]

If the inequality is strict, then a more conservative Republican candidate could also get elected. Hence, (12) must hold with equality in equilibrium.

The net benefit for a voter of type $\theta$ from the Democratic candidate is

\[-(1 - \gamma)(\theta - \bar{x}'_D)^2 - \gamma(\theta - x_{i,D})^2 + (1 - \gamma)(\theta - \bar{x}_R)^2 + \gamma(\theta - x_{i,R})^2, \tag{13}\]

which is linear in $\theta$. Thus, if the Republican primary voter at $m_{i,R}$ strictly prefers to win, then the
fact that $M_i$ is indifferent implies that $m_{i,D}$ would be strictly better off if the Democrat wins. Hence if $x_{i,D} \neq M_i$, the Democrat could win by moving $x_{i,D}$ marginally closer to $M_i$, since this would make $M_i$ strictly better off. Thus, $x_{i,D} = M_i$. However, since $x_D'$ is closer to $M_i$ than $x_D$ this implies that the median voter at $M_i$ strictly prefers the Democrat, contradicting (12).

Finally, suppose that the Republican is indifferent between winning and not winning. Indifference of $M_i$ and the linearity of (13) in $\theta$ therefore imply that all types $\theta$ are indifferent, i.e., the derivative of (13) with respect to $\theta$ is zero. Thus,

$$ (1 - \gamma)(x_D' - \bar{x}_D) + \gamma(x_{i,D} - x_{i,R}) = 0. $$

(14)

This and the fact that $x_D' < \bar{x}_R$ imply $x_{i,D} > x_{i,R}$. Now consider the voter type $\theta$ located at $x_D'$. This type is strictly closer to both the Democratic national policy as well as the policy of the local Democrat, and as a consequence, (13) is strictly positive for this type. However, (14) implies that (13) is constant, and hence type $\theta = M_i$ also strictly prefers the Democrat, contradicting (12). Thus, all districts $i$ with $M_i < 0.5(\bar{x}_D + \bar{x}_R)$ elect Democrats. Similarly, it follows that all districts $M_i > 0.5(\bar{x}_D + \bar{x}_R)$ elect Republicans, which proves the statement.

It remains to prove monotonicity of positions. Consider a district $M_i < 0.5(\bar{x}_D + \bar{x}_R)$. Using the same argument as above it follows that the Republican cannot win with $x_{R,j} = M_i$. Thus,

$$ -(1 - \gamma)(M_i - \bar{x}_D)^2 - \gamma(M_i - x_{i,D})^2 \geq -(1 - \gamma)(M_i - \bar{x}_R)^2. $$

(15)

Let $M_j < M_i$, then monotonicity in $\theta$ of the net-benefit of voting for the Democrat implies

$$ -(1 - \gamma)(M_j - \bar{x}_D)^2 - \gamma(M_j - x_{i,D})^2 > -(1 - \gamma)(M_j - \bar{x}_R)^2. $$

(16)

Since only districts greater than $k$ elect Republicans, the median party policy would remain the same if the Republican wins in district $j$, i.e., $x_R' = \bar{x}_R$ remains unchanged, and the righthand-side of (16) is therefore median voter $M_j$'s payoff from the Republican. If the equality in (15) is strict, then $x_{i,D} = m_{i,D}$. In this case (16) is also strict and therefore since $m_{j,D} \leq m_{i,D}$ policy $x_{j,D} \leq x_{i,D}$.
If, instead, equality holds in (15) then the fact that (16) is a strict inequality again means that $x_{j,D} \leq x_{i,D}$, with a strict inequality if $x_{i,D} > m_{i,D}$ or $m_{j,D} < m_{i,D}$.

The argument that Republican policy are also monotone for $i > k$ is similar.

**Proof of Statement 2(b):** In the text we showed that conditions (2) to (6) are necessary.

**Proof of Statement 3:** We next, show that solutions to equations (2) to (5) exist.

Recall that $x_{r,R} \geq M_r > M_d$. Hence, (2) implies

$$x_{d,D} = M_d - \sqrt{1 - \gamma (x_{r,R} - M_d)} \quad (17)$$

Rewriting (3) yields

$$(1 - \gamma)(x_{r,R} - M_{d+1})^2 - (1 - \gamma)(x_{d,D} - M_{d+1})^2 = \gamma (x_{d+1,D} - M_{d+1})^2 \quad (18)$$

so a solution for $x_{d+1,D}$ exists only if the left-hand side of (18) is non-negative. Since $x_{r,R} \geq M_r > M_{d+1}$ and $x_{d,D} \leq M_d < M_{d+1}$, we get

$$x_{r,R} - M_{d+1} \geq M_{d+1} - x_{d,D} \quad (19)$$

Using (17) implies that (19) holds if and only if

$$\left(1 - \sqrt{1 - \gamma} \right) (x_{r,R} - M_{d+1}) \geq \left(1 + \sqrt{1 - \gamma} \right) (M_{d+1} - M_d),$$

which holds if $M_d$ and $M_{d+1}$ are sufficiently close since $x_{r,R} \geq M_r > M_{d+1}$. In this case there exists a candidate position $x_{d+1,D} < M_{d+1}$ that satisfies (3).

Now suppose that $M_r = M_{r+1}$. Then the fact that $x_{d,D} \leq M_d$ and $x_{d+1,D} \leq M_{d+1}$ implies that in this case (4) and (5) can be solved for $x_{r,R}$ and $x_{r+1,R}$.

Further, subtracting the right-hand sides in (4) and (5) with respect to $M_r$ and $M_{r+1}$ yields a matrix of full rank. Thus, the implicit function theorem implies that there exists a solution of (4) and (5) in a neighborhood of $M_r$ and $M_{r+1}$, i.e., as long as $M_r$ and $M_{r+1}$ are sufficiently close to
Finally, suppose that (6) holds. Then the candidate positions in the remaining districts follow immediately from these variables. In districts \( i \leq k \) the Republicans are at \( x_{R,k} = M_k \) and the Democratic positions satisfy

\[
-(1 - \gamma)(x_{d,D} - M_i)^2 - \gamma(x_{i,D} - M_i)^2 \geq -(1 - \gamma)(x_{r,R} - M_i)^2. 
\] (20)

where the strict inequality holds if \( x_{i,D} = -m \).

In districts \( i > k \) the Democrat is at \( x_{D,i} = M_i \) and \( x_{R,i} \) satisfies

\[
-(1 - \gamma)\left(\frac{x_{r,R} + x_{r+1,R}}{2} - M_i\right)^2 - \gamma(x_{i,R} - M_i)^2 \geq -(1 - \gamma)\left(\frac{x_{d,D} + x_{d+1,D}}{2} - M_i\right),
\] (21)

where the strict inequality holds if \( x_{i,R} = m \). ■

9 Alternative definition of secure districts for Table 2

Tables 3 and 4 present the results for open seat House elections from 1990 to 2010 (102nd to 112th Congress) analogous to that in Table 2, but defining districts as secure if they have at least an 85 or 90 percent probability of voting for the ideologically preferred party in an open race, respectively.

For the 85 percent threshold, there are 494 district-year observations: 94 safe Republican districts, 83 safe Democratic districts, and 317 district-year combinations in which an open seat race is competitive, of which 185 are won by the Republican and 132 are won by the Democratic candidate.

For the 90 percent threshold, there are 502 district-year observations: 73 safe Republican districts, 68 safe Democratic districts, and 361 district-year combinations in which an open seat race is competitive, of which 209 are won by the Republican and 152 are won by the Democratic candidate.

The number of observations varies slightly between regressions because we have to remove
Table 3: The relationship between Democratic and Republican DW-Nominate scores and district PVI in secure (85%+) and non-secure districts

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democrat</td>
</tr>
<tr>
<td>Secure</td>
<td>0.327</td>
<td>0.761***</td>
</tr>
<tr>
<td></td>
<td>(0.385)</td>
<td>(0.132)</td>
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<tr>
<td>Non Secure</td>
<td>1.209***</td>
<td>1.429***</td>
</tr>
<tr>
<td></td>
<td>(0.270)</td>
<td>(0.161)</td>
</tr>
<tr>
<td>Difference</td>
<td>-0.882*</td>
<td>-0.668***</td>
</tr>
<tr>
<td></td>
<td>(0.466)</td>
<td>(0.213)</td>
</tr>
<tr>
<td>r²</td>
<td>0.380</td>
<td>0.596</td>
</tr>
<tr>
<td>N</td>
<td>279</td>
<td>215</td>
</tr>
</tbody>
</table>

*** indicates significance at the 1% level, ** at the 5% level, * at the 10% level.

Table 4: The relationship between Democratic and Republican DW-Nominate scores and district PVI in secure (90%+) and non-secure districts

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democrat</td>
</tr>
<tr>
<td>Secure</td>
<td>0.278</td>
<td>0.727***</td>
</tr>
<tr>
<td></td>
<td>(0.478)</td>
<td>(0.155)</td>
</tr>
<tr>
<td>Non Secure</td>
<td>0.923***</td>
<td>1.324***</td>
</tr>
<tr>
<td></td>
<td>(0.216)</td>
<td>(0.128)</td>
</tr>
<tr>
<td>Difference</td>
<td>-0.645</td>
<td>-0.597***</td>
</tr>
<tr>
<td></td>
<td>(0.521)</td>
<td>(0.204)</td>
</tr>
<tr>
<td>r²</td>
<td>0.377</td>
<td>0.611</td>
</tr>
<tr>
<td>N</td>
<td>282</td>
<td>220</td>
</tr>
</tbody>
</table>

*** indicates significance at the 1% level.
districts that are deemed “safe” for a party given the threshold, but won by the other party. The lower is the threshold, the more often such a case will occur. This is the reason why there are slightly more observations with the more stringent definitions of “safe” used here than in the main text. Note, however, that there are only few such cases — going from the 80 percent threshold used in the main text to a 90 percent threshold only increases observations by 15 from 487 to 502. Just as is Table 2, the effect of district PVI on ideology is substantially weaker in secure districts. Note, however, that because of the small number of districts that are secure for Republicans at a level higher than 90% in open elections, the difference between secure and non-secure districts is not any more statistically significant among Republicans.
References


Camara, O. (2012). Economic policies of heterogeneous politicians. mimeo, USC.


